5

10

15

What is claimed is:

- An abrasive carbon foam produced by the controlled foaming of a blend comprising:
 - A) from about 90 to about 99% by volume of a particulate coal exhibiting a free swell index of between about 3.5 and about 5.0 and of a small diameter; and
 - B) from about 1 to about 10% by volume of a carbide precursor.
- 2) The abrasive carbon foam of claim 1 wherein said particulate coal exhibits a free swell index of between about 3.75 and about 4.5.
- The abrasive carbon foam of claim 1 wherein said carbide precursor comprises a member selected from the group consisting of materials capable of reacting with carbon to form carbides under carbon calcining and graphitizing conditions.
- 4) The abrasive carbon foam of claim 3 wherein said carbide precursor is selected from the croup consisting of: tungsten, silicon and titanium.
- The abrasive carbon foam of claim 3 wherein said carbon precursor powder is of a particle size below about 100 microns.



The abrasive carbon foam of claim 3 which is a semi-crystalline, largely isotropic, porous coal-based product having a density of between about 0.1 and about 0.8 g/cm₃.

5



A method for producing an abrasive carbon foam comprising:

- A) comminuting coal exhibiting a free swell index of between about 3.5 and about 5.0 to a small particle size to form a particulate coal;
- B) blending said particulate coal with from about 1 to about 10% by volume of a carbide precursor to form a reactive blend;
- C) heating said reactive blend in a mold under a nonoxidizing atmosphere to a temperature of between
 about 300° C and about 600° C and soaking at this
 temperature for a period of from about 10 minutes to
 about 12 hours to form a green foam blend;
- D) carbonizing said green foam blend to form a carbonized foam by heating to a temperature of between about 600°C and about 1600°C in an inert atmosphere and holding at said temperature for a period of from about 1 to about 3 hours to form a carbonized foam; and
- E) graphitizing said carbonized foam by heating said carbonized foam to a temperature of between about

10

15

20

1700°C and about 3000°C in an inert atmosphere and holding at said temperature for a period of less than about one hour to form said abrasive carbon foam.

5

8) The method of claim 7 wherein said carbide precursor comprises a member selected from the group consisting of materials capable of reacting with carbon to form carbides under carbon calcining and graphitizing conditions.

10

9) The method of claim 8 wherein said carbide precursor is selected from the croup consisting of: tungsten, silicon and titanium.

. .

10) The method of claim 8 wherein said carbon precursor powder is of a particle size below about 100 microns.

15

11) The method of claim 7 wherein said particulate coal exhibits a free swell index of between about 3.75 and about 4.5.

An abrasive carbon foam manufactured by a process comprising:

20

A) comminuting coal exhibiting a free swell index of between about 3.5 and about 5.0 to a small particle size to form a particulate coal;

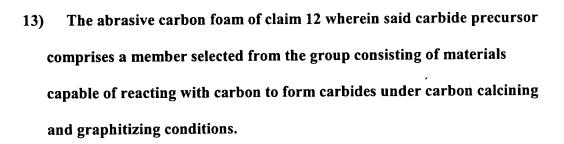
5

10

15



- B) blending said particulate coal with from about 1 to about 10% by volume of a carbide precursor to form a reactive blend;
- C) heating said reactive blend in a mold under a non-oxidizing atmosphere to a temperature of between about 300° C and about 600° C and soaking at this temperature for a period of from about 10 minutes to about 12 hours to form a green foam blend;
- D) carbonizing said green foam blend to form a carbonized foam by heating to a temperature of between about 600°C and about 1600°C in an inert atmosphere and holding at said temperature for a period of from about 1 to about 3 hours to form a carbonized foam; and
- E) graphitizing said carbonized foam by heating said carbonized foam to a temperature of between about 1700°C and about 3000°C in an inert atmosphere and holding at said temperature for a period of less than about one hour to form said abrasive carbon foam.
- The abrasive carbon foam of claim 12 wherein said particulate coal 13) 20 exhibits a free swell index of between about 3.75 and about 4.5.



5

14) The abrasive carbon foam of claim 13 wherein said carbide precursor is selected from the croup consisting of: tungsten, silicon and titanium.

10

15) The abrasive carbon foam of claim 12 wherein said carbon precursor powder is of a particle size below about 100 microns.

15

16) The abrasive carbon foam of claim 12 which is a semi-crystalline, largely isotropic, porous coal-based product having a density of between about 0.1 and about 0.8 g/cm₃.

20